

Presentation to NIST VCAT

Linda Capuano

Board on Assessment of NIST Programs

September 10, 2002

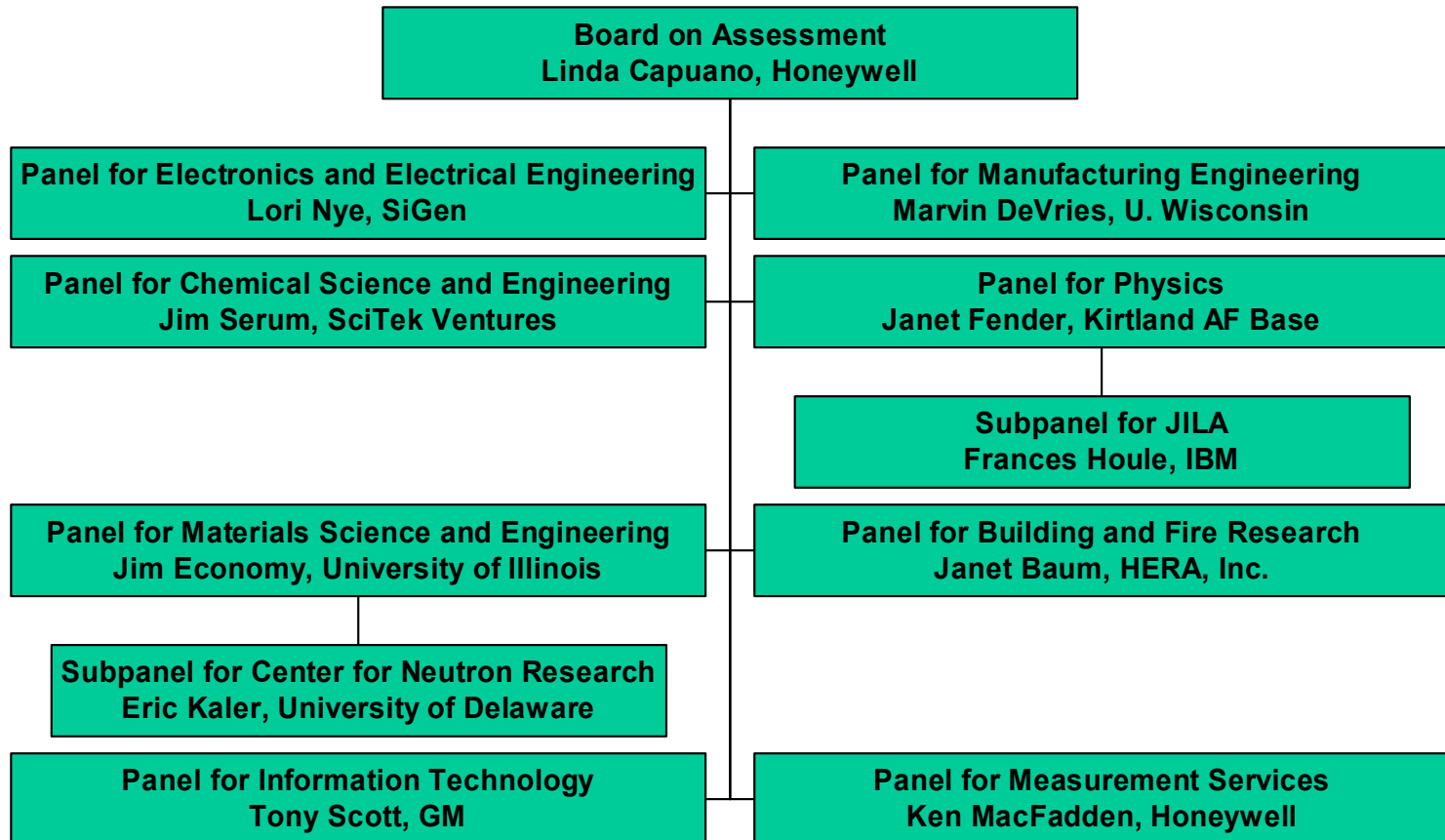
Outline

- Description of assessment
- Overall findings for NIST Laboratories
- Discussion of Metrics
- Summary

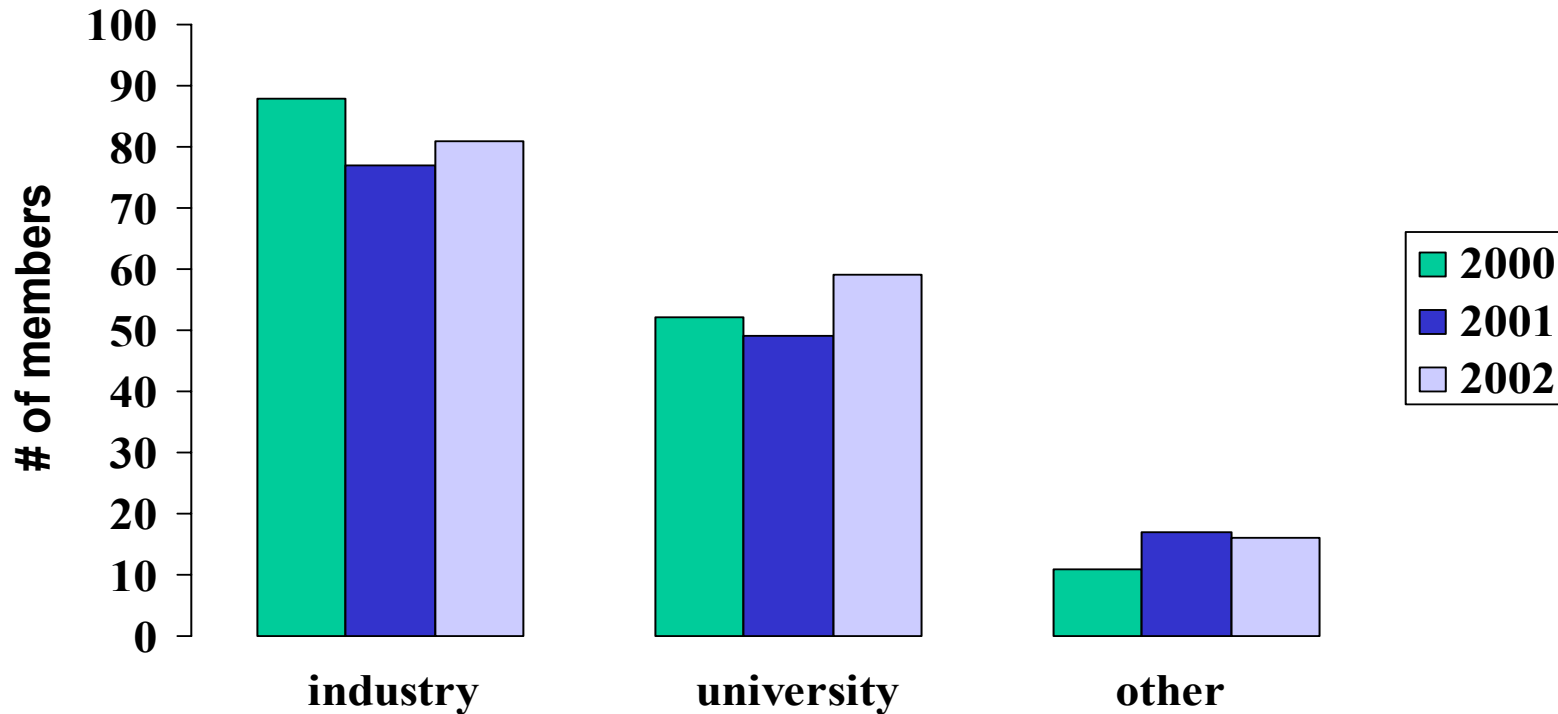
Charge to the Board

- Assess Laboratory Programs
 - Technical Merit
 - Effectiveness of execution and dissemination
 - Relevance to customer needs
 - Adequacy of facilities, equipment and human resources

Organization of Board and Panels



Participants by Sector



Diversity of Participants (FY 2002 Assessment)

- 31% of panelists were new (the remainder were continuing members)
- 83% of panelists have Ph.D.'s
- 27% of panelists are women or minorities
- 15% of panelists are members of the National Academies of Sciences and Engineering

Outline of Process

- December: Board meets, new member orientation
- Jan./Feb.: Divisional subpanels visit labs (1½ days)
- Feb./Mar.: Laboratory panels meet at NIST (1½ days)
- May: Board receives panel reports, meets with OU heads, drafts overview (1½ days)
- Early August: Pre-pub report to NIST
- End of Sept.: Final report delivered

Improvements in Process

- Board has used best practices exercises to develop more uniform, improved process and reports; some examples:
 - defining and disseminating themes for assessment in December
 - pre-visits by divisional review groups
 - panel vice-chairs for smooth leadership transitions
 - skip-levels sessions at panel meetings
 - annual feedback sessions with lab directors
 - ad hoc cross-cut panels to assess programs (e.g. microelectronics) that cross NIST organizational units

2002 Assessment

- Technical Merit
- Relevance and Effectiveness
- Resources
- Resources and Planning

Technical Merit

- Technical quality of the on-going work remains high
- Some work outstanding in its excellence, creativity, or level of skill demonstrated.

Technical Merit

- Demonstration of frequency standard based on optical frequency atomic transition
 - Potential to achieve uncertainties 1000 times better than current standards.
- Demonstration of single-photon detector
 - Extension of expertise in single-electron detection; coupled electron-counting to InAs quantum dot.

Relevance and Effectiveness

- Generally a good balance between basic research and efforts directed at specific applications
- Flexibility to react to unanticipated needs:
 - DNA forensics tools for WTC identification
 - Use of simulation to predict anthrax flow through Hart Senate Office Building
 - Verification of mail decontamination protocol through radiation dosimetry

Relevance and Effectiveness

- NIST-wide strategic planning has generated important critical thinking—Strategic Focus Areas
- Laboratory strategic planning efforts span a spectrum of quality and effectiveness
- Sharing of best practices could raise level of performance

Resources

- Staff is key resource
- Private-sector competition putting less pressure on recruitment and retention
- Significant retirements can be anticipated in next 5-10 years
 - Planning now for these retirement is crucial
 - Need to capture key experience—mentoring program

Resources

- Equipment overall adequate
- Situation mixed
 - Some outstanding, unique equipment (e.g. nanostructure assembly and characterization)
 - Some not as advanced as that used by NIST customers (semiconductor manufacturing metrology)

Resources

- Facilities have seen some improvements
- Substandard conditions still exist at Boulder
 - Some facilities inadequate for the equipment they house
 - Facility deficiencies hamper the efficiency of work

Resources and Planning

- Strategic planning still not mature enough to significantly influence resource planning
- Where meaningful plans exist, they are being used to determine current expenditures
- Did not see use of plans to prospectively plan resource utilization

Resources and Planning

- Personnel plans needed to guide hiring as significant retirements occur. Should be tied to strategic plan.
- Major equipment plan needed, especially for equipping the AML
- Facilities plan does not seem to be tied to strategic plan

Resources and Planning

- Some SFA's require better definition, more aggressive pursuit
 - Need to market capabilities in Homeland Security
 - Biotechnology effort isn't sufficiently sized for the significant sector that already exists
 - NIST share of National Nanotechnology Initiative funding small relative to its potential contributions

Metrics

- Informal request from NIST that BOA consider more quantitative metrics for assessment
- BOA ran metrics experiment at May 2002 meeting
- Red/Yellow/Green light ratings given by panel chairs and vice-chairs

Experimental Metrics (Page 1)

Technical Merit		Score
Are programs of world-class technical quality?		
Does NIST work define state-of-the-art in key areas?		
Does NIST measure progress of technical programs successfully?		
	Are metrics specified?	
	Are metrics understood by relevant groups	
	Are metrics applied consistently?	
	Are NIST programs adjusted based upon the results of the metrics?	

Experimental Metrics (Page 2)

Program Relevance and Effectiveness		Score
How well do NIST technical activities align with customer expectations?		
	Is NIST effective in meeting customer needs?	
	Are NIST results having an impact on customer performance?	
	Is NIST targeting the right customer set?	
	Are societal impacts clear and significant?	
Does NIST measure impact successfully?		
	Are assessment processes specified?	
	Are assessment processes applied consistently?	
22	Are assessment processes understood by relevant groups?	

Experimental Metrics (Page 3)

Program Relevance and Effectiveness (cont'd)		Score
Is NIST strategic planning sufficient to allow technical program planning?		
	Is the plan documented clearly?	
	Is the strategic plan understood by the relevant technical organization?	
	Is the plan used in technical program selection process?	
	Are the technical programs aligned with stated objectives and schedules?	
	Are the technical programs adjusted as the plan changes?	
	Are the success of the technical programs linked to the strategic plan?	
Are criteria sufficient for setting priorities and selecting programs?		

Experimental Metrics (Page 4)

Resources		Score
Are the people and skills available to accomplish the stated objectives?		
	Are roles and responsibilities documented?	
	Are roles and responsibilities understood?	
	Are processes and tools in place to allow staff to be effective in roles and execute to responsibilities?	
	Is performance feedback in place?	
	Are there consequences which result from the feedback?	
24	Is project performance linked to management responsibility?	

Experimental Metrics (Page 5)

Resources, cont'd		Score
Facilities		
	Are facilities adequate to achieve current technical goals and schedules?	
	Are facilities plans adequate to achieve future technical goals and schedules?	
Capital Equipment		
	Are capital equipment plans adequate to achieve current technical goals and schedules?	
	Are capital equipment plans adequate to achieve future technical goals and schedules?	

Metrics

- Result of exercise was unofficial, not released.
- Laboratories ran spectrum from high performance to needing immediate attention.
- NIST is evaluating the experiment.

Metrics

- October 2002 meeting planned to discuss assessment process, identify means to streamline.
- NIST will present proposals for alternative metrics.

Summary

- Overall technical merit remains high.
- Breadth and depth of talent allows response to known and unanticipated needs.
- Excellent responsiveness to events of Fall 2001.

Summary, cont'd

- Strategic planning varies in maturity; not yet significantly impacting program selection and prioritization everywhere.
- Better resource planning, tied to strategic plan, is needed.
- SFA's are a solid basis for program selection and management.